

1. Details of Module and its structure

Module Detail	
Subject Name	Geography
Course Name	Geography 02 (Class XI, Semester - 2)
Module Name/Title	Drainage – Part 3
Module Id	kegy_20303
Pre-requisites	Knowledge about The Peninsular Drainage System
Objectives	<p>After going through this lesson, the learners will be able to understand the following:</p> <ul style="list-style-type: none">• Indian drainage system• Stages of rivers• Evolution of Peninsular rivers• River system of peninsular rivers-<ul style="list-style-type: none">➤ North flowing rivers➤ West flowing rivers➤ East flowing rivers
Keywords	Non-perennial, Water Divide, Rift Valley, Western Ghats

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Table of Contents:

1. Indian drainage system
2. Stages of rivers
3. Evolution of Peninsular rivers
4. River system of peninsular rivers
 - North flowing rivers
 - West flowing rivers
 - East flowing rivers

Introduction

The peninsular rivers in India originate from central highlands and western Ghats. The Peninsular drainage system is older than the Himalayan one. This is evident from the broad, largely-graded shallow valleys, and the maturity of the rivers. The Western Ghats running close to the west coast acts as the water divide between the major Peninsular rivers, discharging their water in the Bay of Bengal and as small rivulets joining the Arabian Sea.

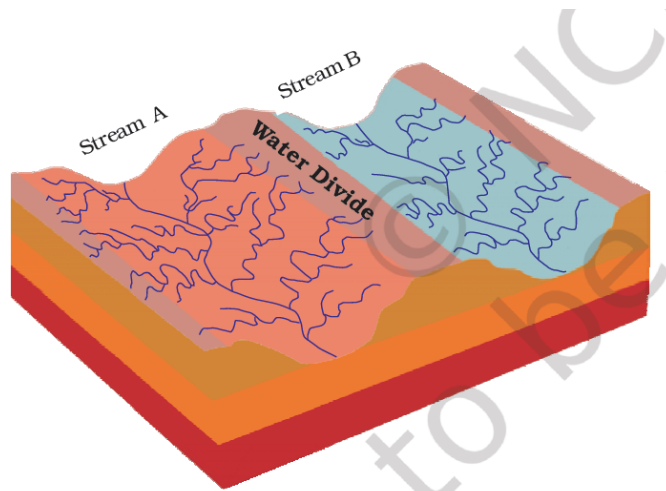


Fig 1. Water divide

Characteristics of Indian Peninsular Rivers

- Most of the Rivers Originate from central highland and Western Ghats.
- Peninsular rivers are super imposed and rejuvenated leading to trillis, radial and rectangular drainage pattern.
- Peninsular rivers are characterised by fixed course with well-adjusted valleys.
- Broad and shallow river course having almost reached their base levels.
- Rivers at maturity stage or old stage
- Absence of meanders.

- With the exception of major Peninsular rivers most of the streams are either ephemeral or seasonal in nature and are dependent on Monsoon rainfall.
- The Narmada and the Tapi rivers flow through the rift valleys from west to east.
- The Chambal, the Sind, the Betwa, the Ken, the Son rivers, originate in the northern part of the Peninsula yet belong to the Ganga river system.
- The other major river systems of the Peninsular drainage are – the Mahanadi, the Godavari, the Krishna and the Kaveri which flow into Bay of Bengal.
- Periyar and Bharathapuzha are the two important rivers of Kerala. These rivers originate in the Western Ghats and flow into the Arabian sea.

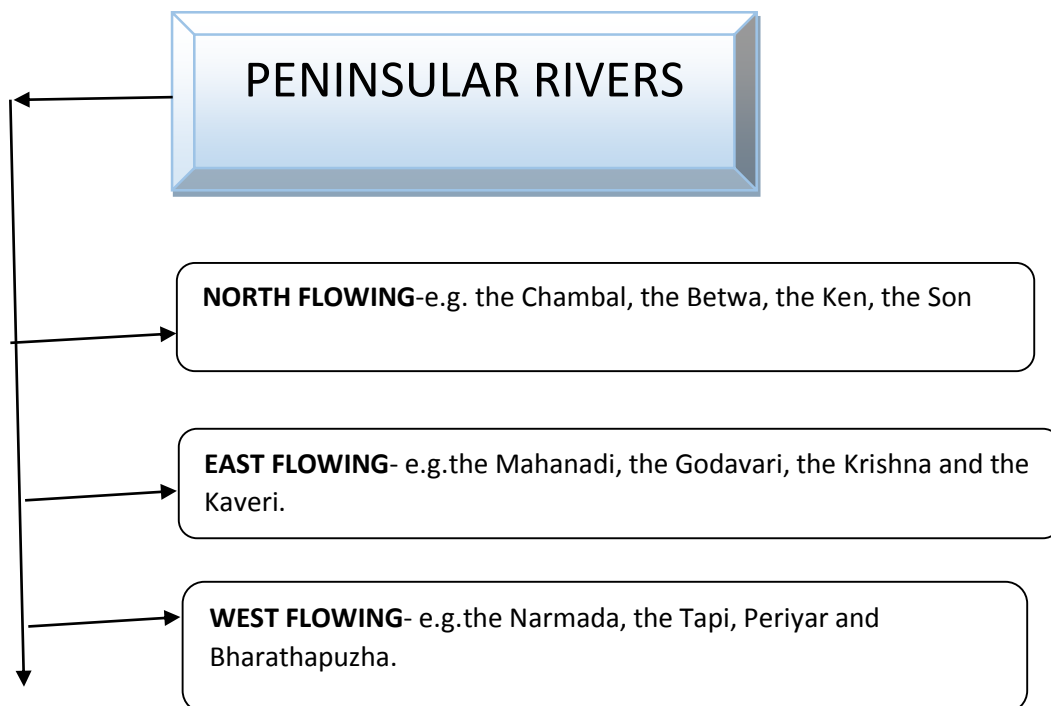


Fig2. Peninsular Rivers



Fig 3. -Major Rivers and Lakes

The Evolution of Peninsular Drainage System

Three major geological events in the distant past have shaped the present drainage systems of Peninsular India:

- (i) Subsidence of the western flank of the Peninsula leading to its submergence below the sea during the early tertiary period. Generally, it has disturbed the symmetrical plan of the river on either side of the original watershed.
- (ii) Upheaval of the Himalayas when the northern flank of the Peninsular block was subjected to subsidence and the consequent trough faulting. The Narmada and the Tapi flow in trough faults and fill the original cracks with their detritus materials. Hence, there is lack of alluvial and deltaic deposits in these rivers.

(iii) Slight tilting of the Peninsular block from northwest to the southeastern direction gave orientation to the entire drainage system towards the Bay of Bengal during the same period.

River Systems of the Peninsular Drainage

There are a large number of river systems in the Peninsular drainage.

A brief account of the major Peninsular river systems is given below:

North Flowing Rivers

- The **Betwa** or **Betravati** is a river in Northern India. It is a tributary of the Yamuna, which rises in the Vindhya Range (Raisen) just to the north of Hoshangabad in Madhya Pradesh and flows towards north-east through Madhya Pradesh and Orchha in Uttar Pradesh. Nearly half of its course, which is not navigable, runs over the Malwa Plateau. The confluence of the Betwa and the Yamuna rivers is in District Hamirpur in Uttar Pradesh, very close to Orchha.

Large part of the catchment of the river falls under semi-arid climatic regions, therefore it has huge fluctuations in the volume of water across seasons. Constructions of **Dams** such as **Rajghat dam, Matatila Dam, Parichha Dam, Dhurwara Dam** have contributed in the generation of hydroelectricity and maintaining the flow of water across seasons, which has contributed in moderating the economy an environment in the catchment to some extent.

The perennial **Chambal** originates at Janapav, south of Mhow town, near Manpur Indore, on the south slope of the Vindhya Range in Madhya Pradesh. The Chambal and its tributaries drain the Malwa region of northwestern Madhya Pradesh, while its tributary, the Banas, which rises in the Aravalli Range, drains southeastern Rajasthan. It ends a confluence of five rivers, including the Chambal, Kwari, Yamuna, Sind, Pahuj, at Pachnada near Bhareh in Uttar Pradesh, at the border of Bhind and Etawah districts. The Chambal River is used for hydropower generation at **Gandhi Sagar dam, Rana Pratap Sagar dam and Jawahar Sagar Dam** and for annual irrigation of 5668.01 square kilometres in the command areas of the right main canal and the left main canals of the Kota Barrage.

- **The Ken River** originates near the village Ahirgawan on the north-west slopes of Barner Range in District Katni and travels a distance of 427 km, before merging with the Yamuna at Chilla village, district Banda in Uttar Pradesh. It receives water

from its own tributaries such as Bawas, Dewar, Kaith and Bains on the left bank, and Kopra and Bearma of the right.

- **Son River** of central India is the second largest of the Ganga southern tributaries after Yamuna River. The Son originates near Amarkantak in District Anuppur Madhya Pradesh just east of the headwater of the Narmada River, and flows north-northwest through Shahdol district in Madhya Pradesh before turning sharply eastward where it encounters the southwest-northeast-Kaimur Range. The Son parallels the Kaimur hills, flowing east-northeast through Uttar Pradesh, Jharkhand and Bihar states to join the Ganga just west of Patna. Its chief tributaries are the Rihand, Kanhar and the North Koel.
- The **first anicut on the Son** was built in 1873–74 at **Dehri**. The Indrapuri Barrage was constructed, 8 kilometres (5 mi) upstream, and commissioned in 1968. The Bansagar Dam in Madhya Pradesh was commissioned in 2008.

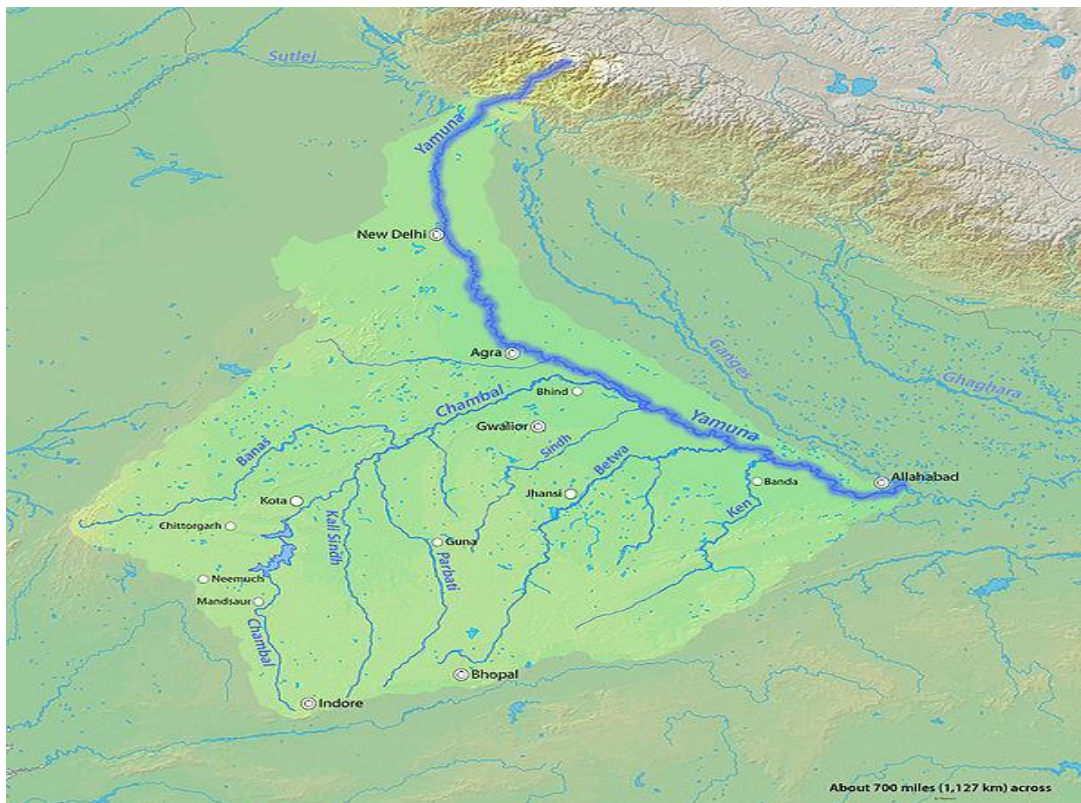


Fig4. Rivers Originating from Central Highland and Flowing North

Source-

<https://hi.wikipedia.org/wiki/%E0%A4%9A%E0%A4%BF%E0%A4%A4%E0%A5%8D%E0%A4%B0:Yamunarivermap.jpg>

East Flowing Peninsular Rivers

- The **Mahanadi** is a major river in East Central India. The word Mahanadi is a compound of the Sanskrit words maha ("great") and nadi ("river"). It originates from the eastern slopes of Amarkantak Plateau near Sihawa in District Raipur of Chhattisgarh and runs through Odisha covering a distance of 851 km to discharge its water into the Bay of Bengal. It drains an area of around 141,600 square kilometres nearly Fifty-three per cent of the drainage basin of this river lies in Madhya Pradesh and Chhattisgarh, while 47 per cent lies in Odisha. The Mahanadi was notorious for its devastating floods thus it was called 'the sorrow of Orissa'. However, the construction of Multipurpose Hirakud Dam has altered the situation to a great extent. Mahanadi is also known for **the Hirakud Dam**. Some part of Mahanadi is navigable in its lower course in Odisha. Today a network of canals, barrages and check dams keep the river well in control.
- The **Godavari** is the largest Peninsular river system. It is also called the Dakshin Ganga. It rises in the District Nasik, Maharashtra and discharges its water into the Bay of Bengal. Its tributaries run through the states of Maharashtra, Madhya Pradesh, Chhattisgarh, Odisha, Telangana and Andhra Pradesh. It is 1,465 km long with a catchment area spreading over 3.13 lakh sq. km. 49 per cent of this, lies in Maharashtra, 20 per cent in Madhya Pradesh and Chhattisgarh, and the rest in Odisha, Telangana Andhra Pradesh. The Penganga, the Indravati, the Pranhita, and the Manjira are its principal tributaries. The Godavari is subjected to heavy floods in its lower reaches to the south of Polavaram, where it forms a picturesque gorge. It is navigable only in the deltaic stretch. The river after Rajamundri splits into several branches forming a large delta.

The river basin is divided into **3 sections**:

- Upper (source to confluence with Manjira),
 - Middle (between confluence of Manjira and Pranhita) and
 - Lower (Pranhita confluence to mouth).
- The major tributaries of the river can be classified as the left bank tributaries which include the Purna, Pranhita, Indravati and Sabari River covering nearly 59.7% of the total catchment area of the basin and the right bank tributaries Pravara, Manjira, Manair together contributing 16.1% of the basin. Pranhita is the largest tributary covering about 34% of its drainage basin. Though the river proper flows only for 113 km by virtue of its extensive

tributaries Wardha, Wainganga, Penganga, the sub-basin drains entire of Vidharba region as well as the southern slopes of the Satpura Ranges. Indravati is the 2nd largest tributary, known as the "lifeline" of the Kalahandi, Nabarangapur of Odisha & Bastar districts from Chhattisgarh. Due to their enormous sub-basins both Indravati and Pranhita are considered rivers in their own right. Manjira is the longest tributary and holds the Nizam Sagar reservoir. Purna is a prime river in the water scarce Marathwada region, Maharashtra.

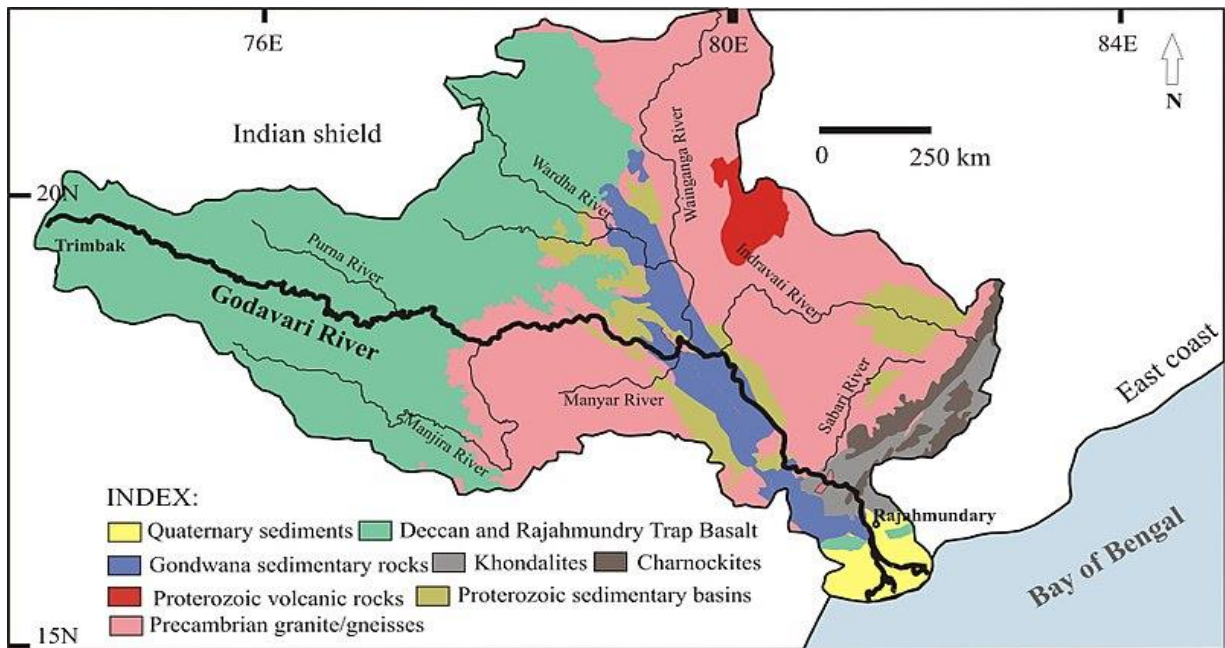


Fig 5. Godavari drainage basin

Source:

https://en.wikipedia.org/wiki/File:Generalized_Geological_Map_of_Godavari_Drainage_Basin.jpg

Dams on Godavari River and its Tributaries

Gangapur Dam, is an earthfill dam on Godavari river near Nashik in Maharashtra.

Jaykwadi Dam-It is located on Godavari river at the site of Village Jaykwadi in Paithan taluka, district Aurangabad, Maharashtra. Jaykwadi is one of the largest earthen dams in Asia. There are total 27 water gates for the dam. Jaykwadi Dam is also called as Nathsagar Dam. **Ghatghar Dam** refers to two associated gravity dams built using roller-

compacted concrete, used first time in India. They are situated in village Ghatghar in district Ahmednagar Maharashtra.

The **Sri Rama Sagar Project** also known as the **Pochampadu Project** is an Indian flood-flow project on the Godavari. The Project is located in District Nizamabad, 3 km away from National Highway 44. It has been described by The Hindu as a "lifeline for a large part of Telangana". Sriramsagar is an irrigation project across river Godavari in Telangana to serve irrigational needs in Karimnagar, Warangal, Adilabad, Nalgonda, and Khammam districts.

The **Krishna River** also known as **Krishnaveni**, is the **fourth-biggest river** in terms of water inflows and river basin area in India, after the Ganga, Godavari and Brahmaputra. and second largest east flowing Peninsular river which rises near Mahabaleshwar in Sahyadri. The river is almost 1,400 kilometres from its source near Mahabaleshwar in Western Ghats to Delta on the east coast. long. It is one of the major sources of irrigation for Maharashtra, Karnataka, Telangana and Andhra Pradesh.

The Koyna, the Tungbhadra and the Bhima are its major tributaries of River Krishna. Of the total catchment area of the Krishna, 27 per cent lies in Maharashtra, 44 per cent in Karnataka and 29 per cent in Andhra Pradesh and Telangana. **Left bank tributaries** of the river is Bhima, Dindi, Peddavagu, Musi, Paleru, Munneru. **Right bank tributaries** are Kudali, Venna, Koyana, Panchganga, Dudhaganga, Ghataprabha, Malaprabha, Tungabhadra rivers. **Dams on Krishna river** are Dhom Dam., Hippargi barrage. Almaty Dam. Narayanpur Dam, Bhima Dam, Jurala Dam, Srisailem Dam. Nagarjuna Sagar Dam.



Fig 6. Krishna river basin

Source-https://commons.wikimedia.org/wiki/File:Krishna_River_basin_map.svg

- The **Kaveri** river is the **third largest river** – after Godavari and Krishna – in South India and the largest in Tamil Nadu which, on its course, bisects the state into North and South. The Kaveri is sacred to the people of South India and is worshipped as a goddess. The Kaveri is also one of the seven holy rivers of India. The Kaveri rises in Brahmagiri hills (1,341m) of istrict Kogadu, Karnataka. Its length is 800 km and it drains an area of 81155 sq km. with many tributaries including Harangi, Hemavati, Shimsha, Arkavathy on left bank. Tributaries on right bank are Lakshmana Tirtha, Kabini, Bhavani, Noyyal, Amravati, Moyar. Since the upper catchment area receives rainfall during the southwest monsoon season (summer) and the lower part during the northeast monsoon season (winter), the river carries water throughout the year with comparatively less fluctuation than the other Peninsular rivers. About 3 per cent of the Kaveri basin falls in Kerala, 41 per cent in Karnataka and 56 per cent in Tamil Nadu. The Kaveri basin is estimated to be 81,155 square kilometres spread three states and a Union Territory: Tamil Nadu, 63,856 square kilometres; Karnataka, 14,273 square kilometres; Kerala, 2,866 square kilometres, and Puducherry, 160 square kilometres. The hydroelectric plant built in 1902 on the left of **Sivanasamudra Falls** on the Kaveri. It was the first hydroelectric plant in Asia. **The Krishna Raja Sagara Dam and the Mettur Dam** are constructed on river kaveri which creates Stanley Reservoir. **Hogenakal falls** popularly known as "**Niagara of India**" and Shivanasamudra are beautiful waterfalls on the Kaveri river.



Fig 7- Kaveri river

Source-

https://hi.wikipedia.org/wiki/%E0%A4%9A%E0%A4%BF%E0%A4%A4%E0%A5%8D%E0%A4%B0:River_Cauvery_EN.png

West Flowing Peninsular Rivers

- The **Narmada River**, also called the *Rewa* and previously also known as *Nerbudda*, is third longest river in central India after the Godavari, and the Krishna. It is also known as "Life Line of Madhya Pradesh and Gujarat" for its huge contribution to the state of Madhya Pradesh and Gujarat in many ways. *Narmada* is a Sanskrit word meaning "the Giver of Pleasure". The Narmada originates on the western flank of the Amarkantak plateau at a height of about 1,057 m. It is one of only three major rivers in peninsular India that run from east to west (longest west flowing river), along with the Tapi River and the Mahi Rivers. Flowing in a rift valley between the Satpura in the south and the Vindhyan range in the north, it forms a picturesque gorge in **marble rocks** and **Dhuandhar waterfall** near Jabalpur. After flowing a distance of about 1,312 km, it meets the Arabian Sea south of Bharuch, forming a broad 27 km long estuary. Its catchment area is about 98,796 sq. km. **The Sardar Sarovar Project** has been constructed on this river.

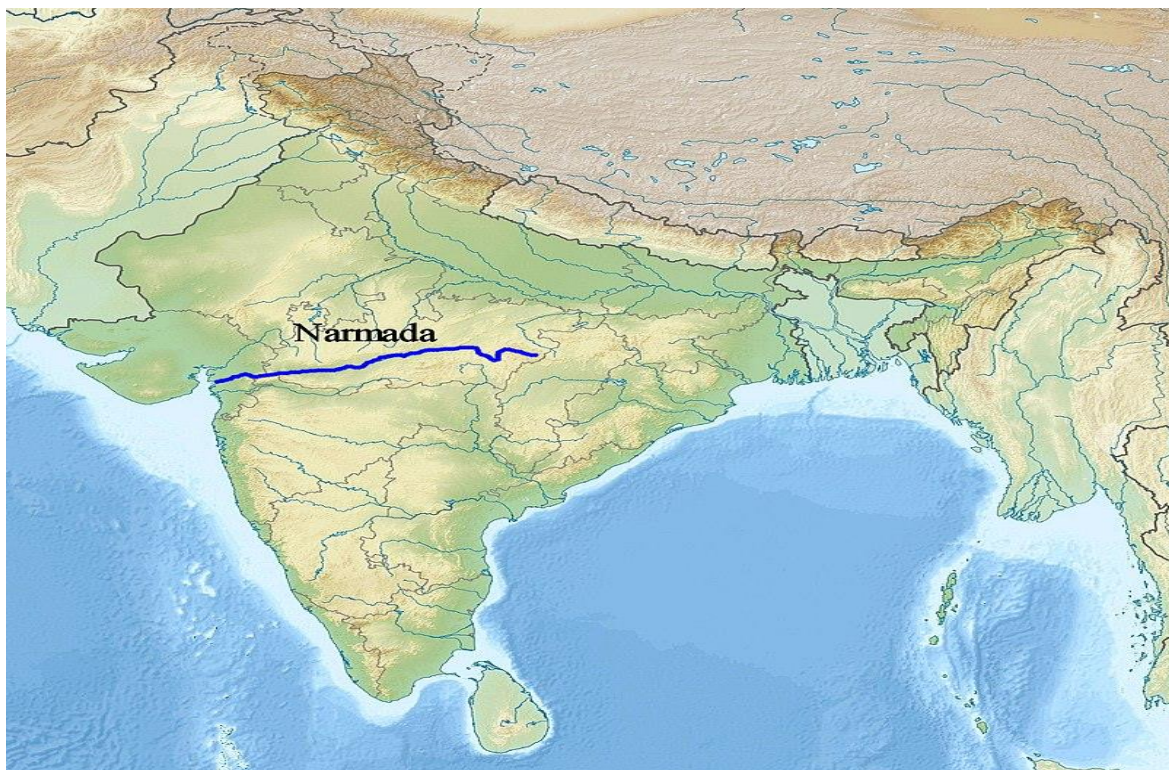


Fig 8. Narmada river

Source-https://en.wikipedia.org/wiki/Narmada_River#/media/File:Narmada_river_map.jpg

- **The Tapi** also known as Tapti is the other important westward flowing river of Central India in between the Godavari and Narmada basins. It originates from Multai in district Betul, Madhya Pradesh and flows westwards over a length of 724 km. covering an area of 65145 sq.km. before draining through the Gulf of Khambhat into the Arabian Sea. Nearly 79 per cent of its basin lies in Maharashtra, 15 per cent in Madhya Pradesh and the remaining 6 per cent in Gujarat. The construction of the **Ukai Dam** brought its waters under control and provides hydroelectric power,
- **The Luni** is also known as the Lavanavari or Lavanavati, which means "**salt river**" in Sanskrit, due high salinity of its water. Luni is the largest river system of Rajasthan, west of Aravali. It originates near Pushkar in two branches, i.e. the **Saraswati and the Sabarmati**, which join with each other at **Govindgarh**. From here, the river comes out of Aravali and is known as Luni. It flows towards the west till Telwara and then takes a southwest direction and enters the Thar Desert to join the Rann of Kuchchh. The entire river system is ephemeral. The rivers flowing towards the Arabian sea have short courses.

Traversing a total of 495 km, The Luni River has a basin of 37,363 sq. km, which includes all or part of the Ajmer, Barmer, Jalore, Jodhpur, Nagaur, Pali, and Sirohi districts of Rajasthan and the Banaskantha and Patan districts of northern Gujarat.

Its major **tributaries** are the Sukri, Mithri, Bandi, Khari, Jawai, Guhiya and Sagi from the **left**, and the Jojari from the **right**. In spite of the high salinity, it is a major river in the region and serves as a primary source of irrigation. The Luni is not saline until it reaches Balotra, where high salt content in the soil impacts the river.

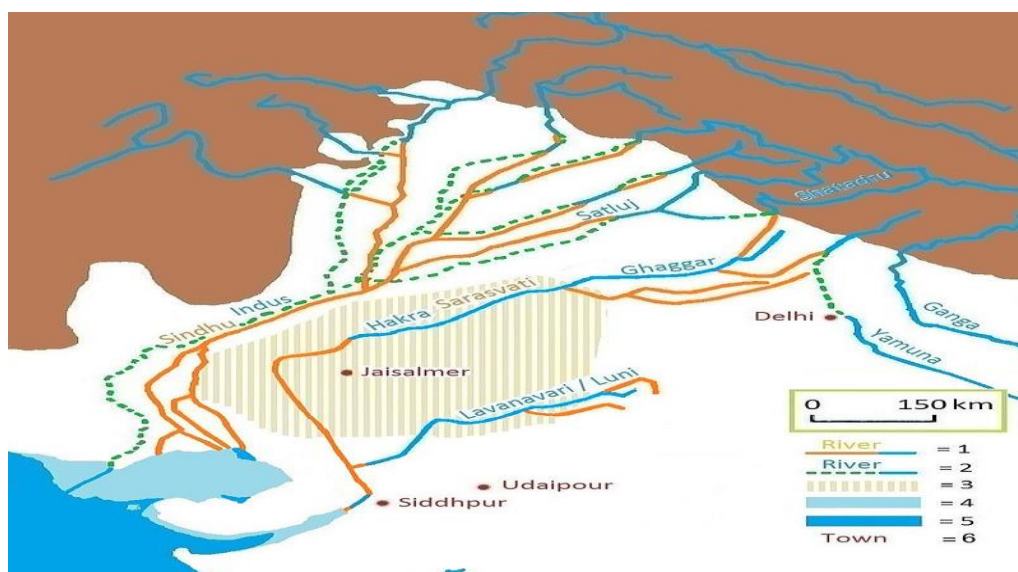


Fig 9-Luni_River

Source-https://en.wikipedia.org/wiki/Luni_River#/media/File:Sarasvati-ancient-river.jpg

Smaller Rivers Flowing Towards the West

The rivers flowing towards the Arabian sea have short courses.

Some important west flowing rivers of Gujarat

- The **Shetrunji** is one such river which rises near Dalkahwa in northeast of the Gir Hills, in district Amreli. Its course begins east-northeast along a lineament which runs parallel to the Narmada Fault, passes north of Palitana's hills, Shatrunjaya, then in a southeasterly direction past Talaja Hill, through a peninsula, before reaching the Gulf of Cambay,
- **Bhadar River** is a river in the Saurashtra peninsula, in the Western Indian state of Gujarat. The Bhadra originates near Aniali village in district Rajkot. It flows south from its origin through Jasdan, then turns south-west and generally west until it empties into the Arabian Sea near Porbandar.
- The **Dhadhar** rises near Ghantar village in Pavagarh Hill in district Panchmahal. **Dhadhar River** is a river in western India, Gujarat with its maximum length of 142 km.
- **Sabarmati and Mahi** are the two famous rivers of Gujarat. The **Sabarmati river** is one of the major west-flowing rivers in India. It originates in the Aravalli Range of district Udaipur, of Rajasthan and meets the Gulf of Khambhat of Arabian Sea after travelling 371 km. in a south-westerly direction across Rajasthan and Gujarat. There are several **reservoirs** on Sabarmati and its tributaries. The Dharoi dam is located on the main river. Hathmati dam, Harnav dam and Guhai dam are located on the tributaries meeting the main river upstream of Ahmedabad while Meshvo reservoir, Meshvo pick-up weir, Mazam dam and Watrak dam are located on tributaries meeting downstream.

The **Mahi** is another important river in western India. It rises in Madhya Pradesh and, after flowing through the Vagad region of Rajasthan, enters Gujarat and flows into the Arabian Sea. It is one of the many west-flowing rivers in India, along with Tapi, Sabarmati, Luni Rivers (Endorheic river) and the Narmada River. Banswara Dam, Kadana Dam, Wanakbori dam are constructed on river Mahi.

Some important west flowing rivers of Maharashtra

- The Vaitarna rises from the Trimbak hills in Nasik district at an elevation of 670 m.
- The Kalinadi rises from Belgaum district and falls in the Karwar Bay.
- The source of Bedti river lies in Hubli Dharwar and traverses a course of 161 km.

Important west flowing rivers of Karnataka.

- The Sharavati is another important river in Karnataka flowing towards the west. The Sharavati originates in district Shimoga, Karnataka and drains a catchment area of 2,209 sq. km. The river Sharavati originates at a place called Ambutheertha in the Thirthahalli taluk. According to ancient legend, the god Rama shot at the ground with his Ambu (translates to bow and arrow) because his wife, Sita, was thirsty. When his arrow hit the ground, water poured out (translates to Thirtha) and quenched her thirst. Because the river, according to the legend, originated with this event, the river is called "Sharavati" as "Shara" translates to arrow.
- The total length of the river is around 128 km and it joins the Arabian Sea at Honnavar in district Uttara Kannada. On its way, the Sharavati forms the **Jog Falls** where the river falls from a height of 253 m. The river is dammed at Linganamakki; the portion of the river above the dam is upstream and the remaining is downstream. The major tributaries of the river are Nandihole, Haridravathi, Mavinahole, Hilkunji, Yennehole, Hurlihole, and Nagodihole, Sharavati river basin falls into two districts of Karnataka namely Uttara Kannada and Shimoga.



Fig 10. Gersoppa (Jog) fall

Important rivers of Goa

Goa has two important rivers which can be mentioned here. One is **Mandovi** and the other is **Zuari**. Mandovi also known as **Mahadayi** or **Mhadei** river, is described as the lifeline of the Indian state of Goa. The Mandovi and the Zuari are the two main rivers in the state of Goa. Mandovi joins with the Zuari at a common creek at Cabo Aguada both flush out into the Arabian Sea, forming the Mormugao harbour. The river has a length of 77 kilometres, 29 kilometres in Karnataka and 52 kilometres in Goa. It originates from a cluster of 30 springs at Bhimgad in the Western Ghats in district Belagavi, Karnataka. Dudhsagar and Varapoha are two important falls on this river. The river is also known as the Gomati in a few places. The Mandovi enters Goa from the north via the Sattari Taluka and from district Uttara Kannada, Karnataka near the Castle Rock Railway Station. The Mandovi flows through Belagavi, Uttara Kannada in Karnataka and Cumbarjua, Divar and Chorão in Goa, eventually pouring into the Arabian Sea. The river Mapusa is a tributary of the Mandovi. Zuari is the largest river in the state of Goa. It is a tidal river which originates at Hemad-Barshem in the Western Ghats. The Zuari and Mandovi Rivers form an estuarine system.

Important rivers of Kerala

- Kerala has a narrow coastline. The longest river of Kerala, Bharathapuzha rises near Annamalai hills. **Bharathappuzha** also known as the **Nila**, is a river in India in the state of Kerala. The total length of Bharathapuzha is 250 km of which 41 km runs along Tamil Nadu from where it originates. It is also known as Ponnani. It drains an area of 5,397 sq. km.



Fig 11-Bharathappuzha

The **Periyar** is the second largest river of Kerala. Its catchment area is 5,243 sq. km. lake after traversing a course of 177 km. The Periyar has a total length of approximately 244 kilometres.



Fig 12 Periyar River

source-

[https://en.wikipedia.org/wiki/Periyar_\(river\)#/media/File:Location_of_Peiryar_River_Kerala.png](https://en.wikipedia.org/wiki/Periyar_(river)#/media/File:Location_of_Peiryar_River_Kerala.png)

Another river of Kerala worth mentioning is Pamba which falls in the Vemobanad. The Pamba originates at Pulachimalai hill in the Peerumedu plateau in the Western Ghats at an altitude of 1,650 metres.

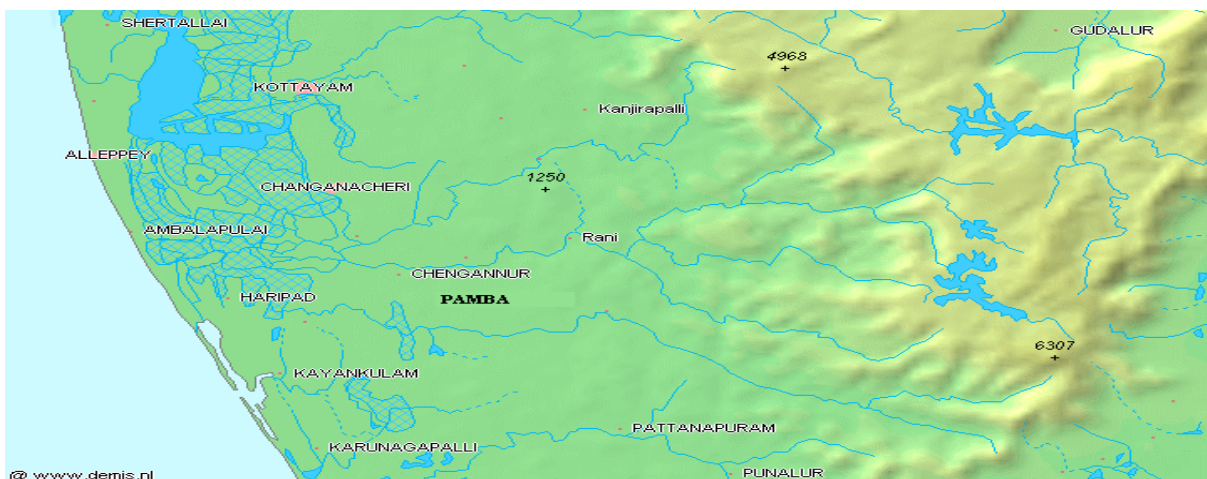


Fig13- Pamba River

source-https://en.wikipedia.org/wiki/Pamba_River#/media/File:Pamba.PNG

A comparative importance of west flowing small rivers

<i>River</i>	<i>Catchment area sq. km</i>
Sabarmati	21,674
Mahi	34,842
Dhandhar	2,770
Kalinadi	5,179
Sharavati	2,029
Bharathapuzha	5,397
Periyar	5,243

Small Rivers Flowing towards the East

There are a large number of rivers flowing towards the east along with their tributaries. There are small rivers which join the Bay of Bengal, though small, these are important in their own right. The Subarnrekha, the Baitarni, the Brahmani, the Vamsadhara, the Penner, the Palar and the Vaigai are important rivers.

<i>River</i>	<i>Catchment area sq. km</i>
Subarnarekha	19,296
Baitarni	12,789
Brahmani	39,033
Penner	55,213
Palar	17,870

- The **Subarnarekha River** (also called the **Swarnarekha River**) flows through the Indian states of Jharkhand, West Bengal and Odisha. The prominent tributaries of the Subarnarekha are Kharkai, Roro, Kanchi, Harmu Nadi, Damra, Karru, Chinguru, Karakari, Gurma, Garra, Singaduba, Kodia, Dulunga and Khaijori. The Kharkai meets the Subarnarekha at Sonari (Domuhani), a neighborhood of Jamshedpur. Hundru Falls is created on the course of the Subarnarekha, where it falls from a height of 98 metres.
- The **Baitarani** (also spelled **Vaitarani**) is one of six major rivers of Odisha, The Baitarani originates from the Gonasika/Guptaganga (Cow Nose Shaped) hills, and starts flowing over a stone looking like the nostril of a cow at an elevation of 900 mt above mean sea level. After flowing for about half a kilometre the river flows underground and is not visible from outside. During this stretch the Baitarani is known

by the name Guptaganga or the Gupta Baitarani, in Gonasika of Keonjhar district in Odisha before it resurfaces and flows about 360 km before reaching the Bay of Bengal but only after forming a Delta. **rahmani** is a major seasonal river in the Odisha, in Eastern India. The Brahmani is formed by the confluence of the Sankhand South Koel rivers near the major industrial town of Rourkela, together with the river Baitarani, it forms a large delta before emptying into the Bay of Bengal at Dhamra. At about 480 kilometres long, the Brahmani is the second longest river in Orissa after the Mahanadi.

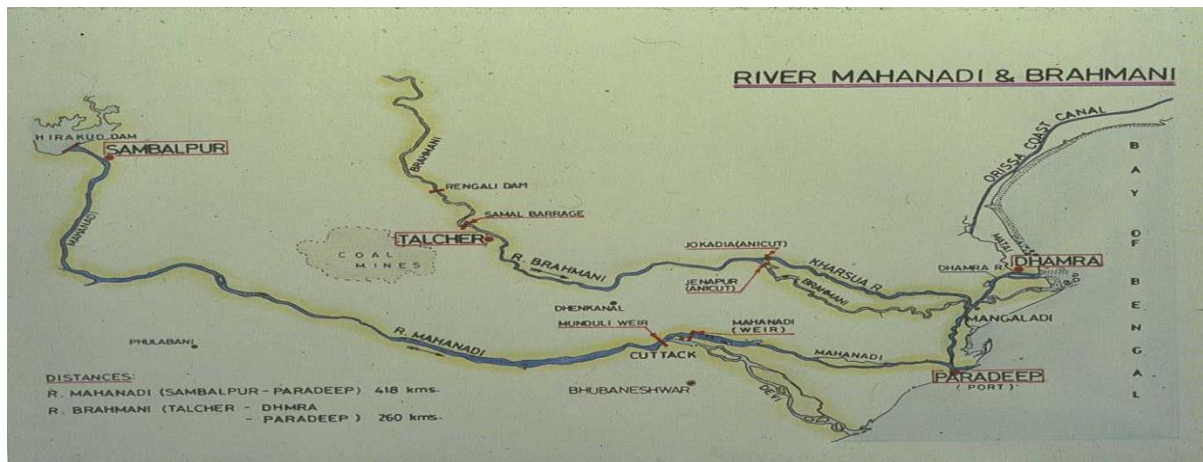


Fig 14- Brahmani_River

source- https://en.wikipedia.org/wiki/Brahmani_River#/media/File:Mahanadi.jpg

- The **Penna** (also known as **Pennar**, **Penner**, **Penneru** and **uttara pinakini**) is a river of southern India. The Penna rises in Nandi Hills in District Chikballapur, Karnataka, and runs north and east through the states of Karnataka and Andhra Pradesh to empty into the Bay of Bengal. flows for 597 km.

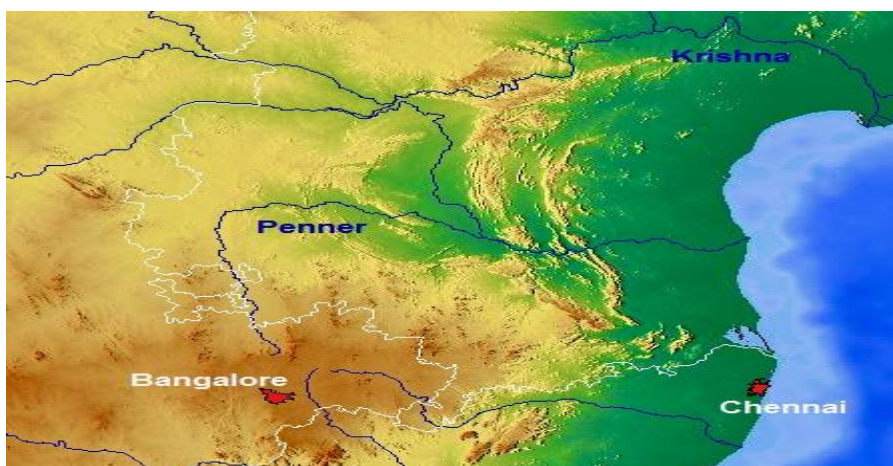


Fig. 15 Penna_River

Source-

https://en.wikipedia.org/wiki/Penna_River#/media/File:Penner_Penna_river_south_Andhra_Pradesh.jpg

- **Palar** is a river of southern India. It rises in the Nandi Hills in district Chikkaballapura Karnataka, and flows 93 kilometres in Karnataka, 33 kilometres in Andhra Pradesh and 222 kilometres in Tamil Nadu before reaching its confluence into the Bay of Bengal at Vayalur about 100 kilometres south of Chennai. It flows as an underground river for a long distance only to emerge near Bethamangala town, from where, gathering water and speed, it flows eastward down the Deccan Plateau.

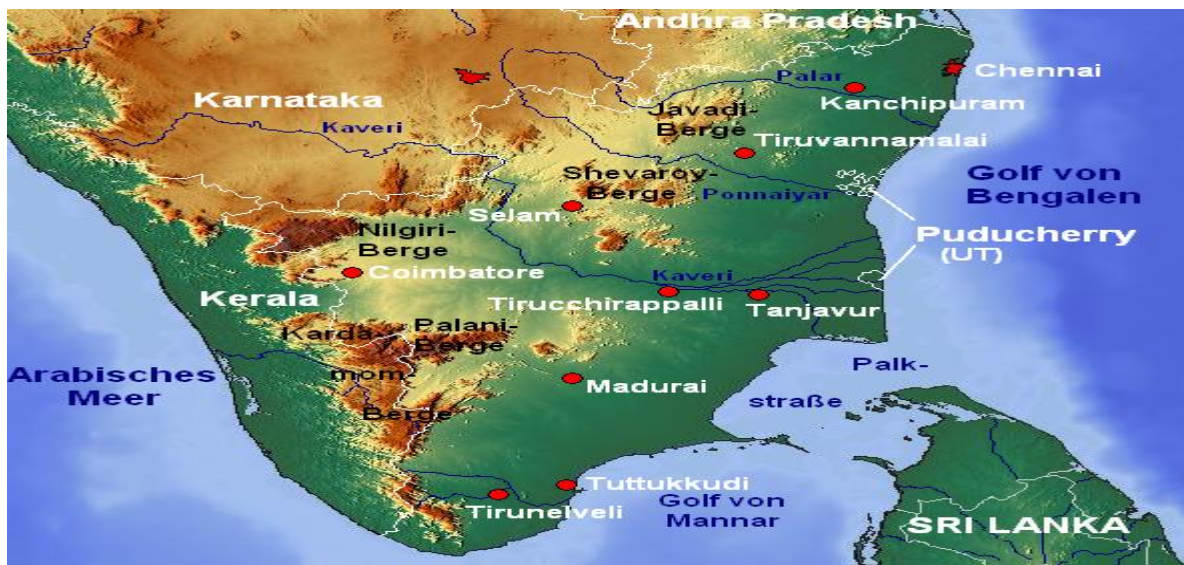


Fig 16- Palar River

source-

https://en.wikipedia.org/wiki/Palar_River#/media/File:Tamil_Nadu_topo_deutsch_mit_Gebirgen.png

- The **Vaigai** is a river in the Tamil Nadu south India. It originates in Varusanadu Hills, the Periyar Plateau of the Western Ghats range, The river empties into the Palk Strait near Uchipuli, close to Pamban bridge in Ramanathapuram District. The Vaigai is 258 kilometres long, with a drainage basin 7,031 square kilometres large.



Fig 17. Vaigai River

source-

https://en.wikipedia.org/wiki/Vaigai_River#/media/File:SVG_Map_River_Vaigai_EN.svg